Noise Generator

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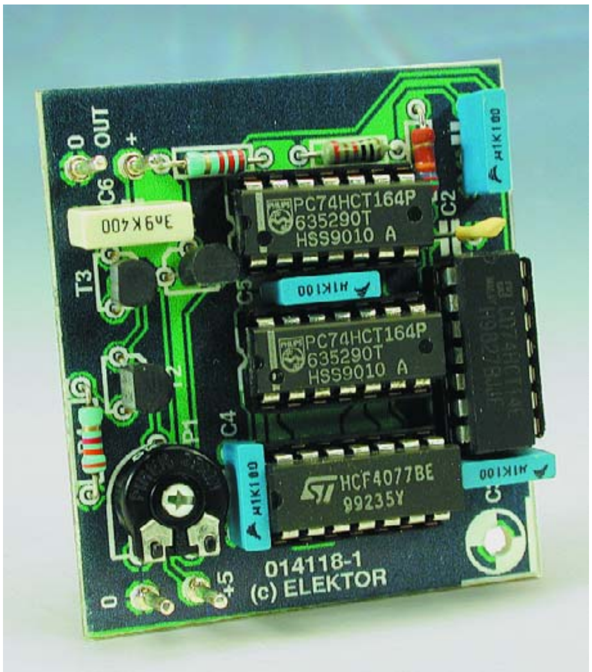
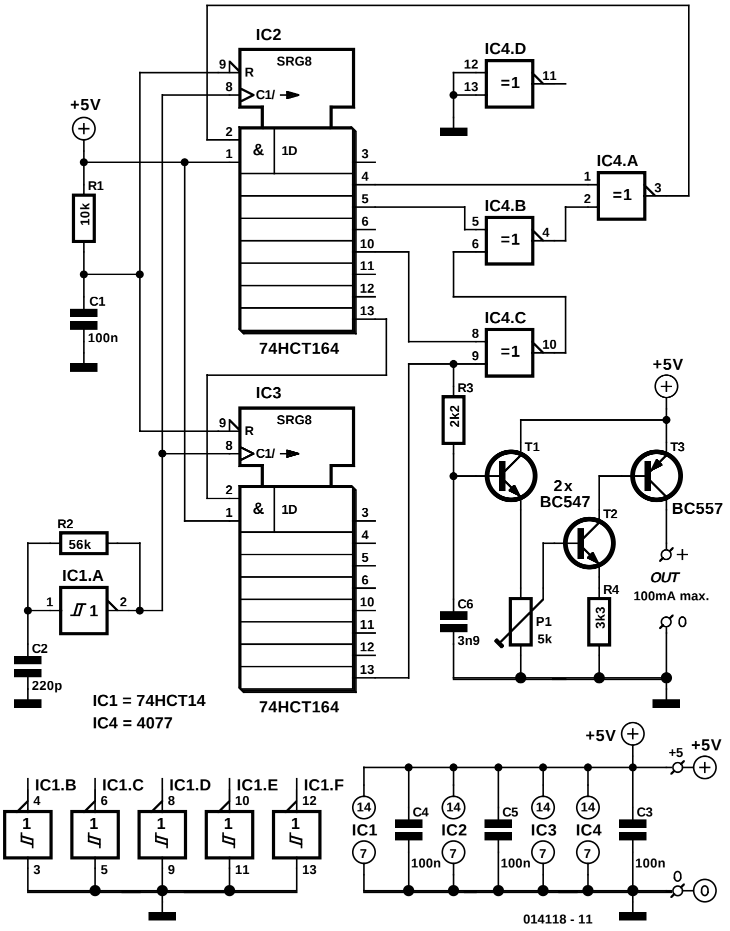




The noise generator proposed here operates according to the digital principle, in contrast with the more classical noise generator, which usually employs the noise voltage of a base/emitter junction to generate the signal. The big difference between the method used here and the classical analogue design is that we are not generating a real noise voltage but a collection of discrete frequencies.

The clock generator built around IC1a produces a signal of about 40 kHz. This signal is used to clock shift registers IC2 and IC3. The data at the input of the double shift register is provided by a network of XNOR gates. (IC4a through c), the output of which depends in turn on the state of the outputs of the shift-register.

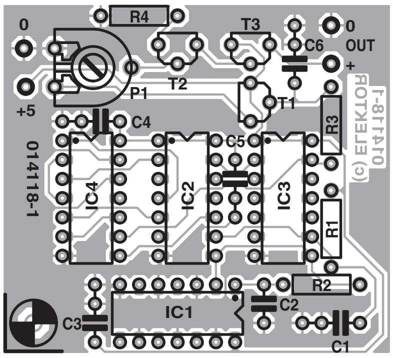
If the feedback network forms a primitive polynomial (in this case $1+V^2+V^3+V^5+V^{16}$), then all possible combinations of ones and zeroes will appear at the output before the cycle will be repeated again. This way you will obtain the longest possible cycle and as a consequence the repeat time is very long. The individual distance between the discrete frequencies is $(f_{clock})/(2^n–1)$ = 40 kHz/65535 = about 0.61 Hz, which is a good approximation to 'real' noise.

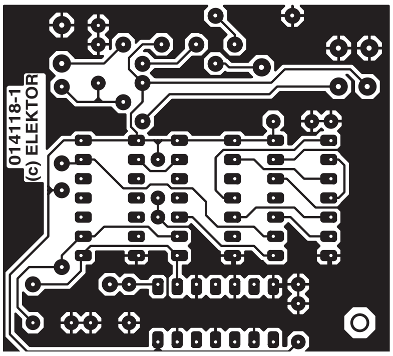
COMPONENTS LIST

Resistors:
R2 = 56kΩ
R3 = 2kΩ2
R4 = 3kΩ3
P1 = 5kΩ preset

Capacitors:
C1,C3,C4,C5 = 100nF
C2 = 820pF
C6 = 3nF9

Semiconductors:
T1,T2 = BC547
T3 = BC557
IC1 = 74HCT14
IC2,IC3 = 74HCT164
IC4 = 4077





The output is delivered by a current source. But if you prefer a voltage source as output, then the signal at the emitter of T2 can be used instead. Note that the output has a DC offset, so make sure that any equipment that is connected can cope with that. If that is not the case, connect an electrolytic capacitor in the signal path.

The circuit operates from a regulated power supply voltage of 5 V. This can be according the usual 7805 recipe with as input power source a 300-mA mains adapter that can supply at least 8 V out. If you make use of the PCB layout shown here, then the construction is unlikely to take you more than half an hour or so. The PCB is unfortunately not available ready-made.

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